Office of the Fire Marshal

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ASSESSING EXISTING FIRE SEPARATIONS AND CLOSURES

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GUIDELINE

September 2002

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September 2002
OFM Section: Fire Safety Standards at (416) 325-3100

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Abstract

This instructional guideline is intended to assist fire officials and building owners, including their agents, to assess existing fire separations and closures in fire separations in order to determine compliance with the Fire Code. The guideline also provides assistance for documenting compliance or non-compliance with Part 9 Retrofit of the Fire Code based upon observations made during an inspection. This guideline is intended for guidance only and is not to be considered a statement of law in this area.

1.0 INTRODUCTION

1.1 Scope

This guideline is intended to help people understand how to interpret and apply the requirements of the Ontario Fire Code (OFC) respecting fire separations and closures regulated under Section 2.2 and Part 9 Retrofit.

The guideline provides example illustrations, photographs and practices that will assist a person in:

- correctly interpreting the regulation requirements,
- assessing fire separations and closures in existing buildings, and
- documenting observations and conclusions.

1.2 Definitions

The person conducting the assessment and interpreting the OFC requirements must know and understand the definitions assigned to various words and terms used in the OFC. The following words and terms have the following meaning in the OFC and this guideline:

Access to exit means that part of a **means of egress** within a **floor area** that provides access to an **exit** serving the **floor area**.
Building means any structure used or intended for supporting or sheltering any use or **occupancy**.
Building area means the greatest horizontal area of a **building** above **grade** within the outside surface of exterior walls or within the outside surface of exterior walls and the centre line of **firewalls**.
Closure means a device or assembly for closing an opening through a **fire separation** such as a door, a shutter, wired glass or glass block and includes all components, such as hardware, closing devices, frames and anchors.
Combustible construction means that type of construction that does not meet the requirements for **noncombustible construction**.
Dwelling unit means a **suite** operated as a housekeeping unit, used or intended to be used as a domicile by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities.
Exit means that part of a **means of egress**, including doorways, that leads from the **floor area** it serves to a separate **building**, an open public thoroughfare or an exterior open space protected from fire exposure from the **building** and having access to an open public thoroughfare.
Fire compartment means an enclosed space in a **building** that is separated from all other parts of the **building** by enclosing construction that provides a **fire separation** having a required **fire-resistance rating**.
Fire damper means a **closure** that consists of a damper installed in an air distribution system or in a wall or floor assembly that is normally held in the open position and that is designed to close automatically in the event of a fire in order to maintain the integrity of the **fire separation**.

Fire-protection rating means the time in hours or fraction thereof that a **closure**, window assembly or glass block assembly will withstand the passage of flame when exposed to fire under specified conditions of **test** and performance criteria, or as otherwise prescribed in the **Building Code**.

Fire resistance means the property of a material or assembly in a **building** to withstand fire or give protection from it and is characterized by the ability of the material or assembly to confine a fire or to continue to perform a given structural function or both.

Fire-resistance rating means the time in hours or fraction thereof that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of **test** and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in the **Building Code**.

Fire separation means a construction assembly that acts as a barrier against the spread of fire and may or may not have a fire-resistance rating or a **fire-protection rating**.

Fire stop means a draft-tight barrier within or between construction assemblies that acts to retard the passage of smoke and flame.

Firewall means a **fire separation** of **noncombustible construction** that subdivides a **building** or separates adjoining **buildings** to resist the spread of fire that has a **fire-resistance rating** as prescribed in the **Building Code** and that has structural stability to remain intact under fire conditions for the required fire-rated time.

Floor area means the space on any **storey** of a **building** between exterior walls and required **firewalls** and includes the space occupied by interior walls and **partitions**, but does not include **exits** and vertical service spaces that pierce the **storey**.

Heavy timber construction means that type of **combustible construction** in which a degree of fire safety is attained by placing limitations on the sizes of wood structural members and on thickness and composition of wood floors and roofs, by avoidance of concealed spaces under floors and roofs and by use of **approved** fastenings, construction details and adhesives for structural members.

Major occupancy means the principal **occupancy** for which a **building** or part thereof is used or intended to be used, and includes the subsidiary **occupancies** that are an integral part of the principal **occupancy**.

Means of egress means a continuous path of travel provided for the escape of persons from any point in a **building** or contained open space to a separate **building**, an open public thoroughfare or an exterior open space protected from fire exposure from the **building** and having access to an open public thoroughfare. **Means of egress** includes both **exits** and **access to exits**.

Noncombustible construction means that type of construction in which a degree of fire safety is attained by the use of noncombustible materials for structural members and other **building** assemblies.

Occupancy means the use or intended use of a **building** or part thereof for the shelter or support of persons, animals or property.

Public corridor means a corridor that provides **access to exit** from more than 1 **suite**.

Retrofit means the minimum performance requirements for life safety for existing **buildings**.

Service room means a room in a **building** used to contain equipment associated with **building** services.

Service space means space in a **building** used to facilitate or conceal the installation of **building** service facilities such as chutes, ducts, pipes, shafts or wires.

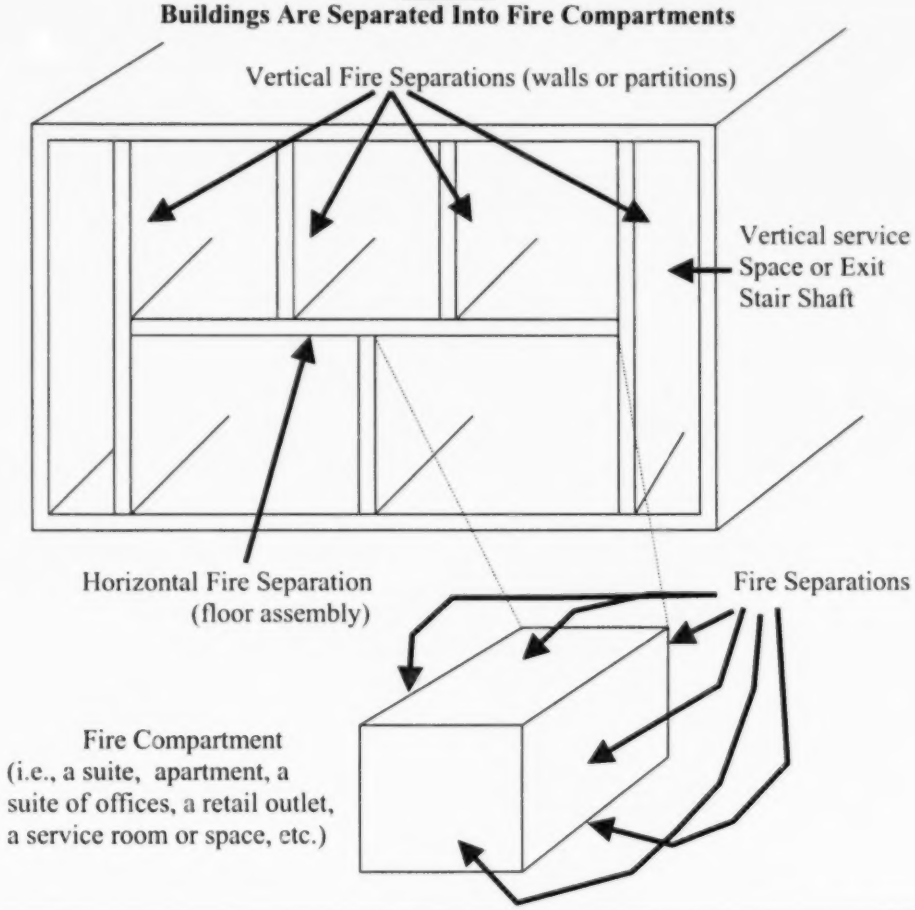
Smoke alarm means a combined **smoke detector** and audible alarm device that is designed to sound an alarm within the room or suite in which it is located when there is smoke within the room or suite.
Storey means that portion of a **building** that is situated between the top of any floor and the top of the floor next above it, and where there is no floor above it, that portion between the top of the floor and the ceiling above it.
Suite means a single room or series of rooms of complementary use, operated under a single tenancy, and includes **dwelling units**, individual guest rooms in motels, hotels, boarding houses, rooming houses and dormitories as well as individual stores and individual or complementary rooms for **business and personal services occupancies**.
Vertical service space means a shaft oriented essentially vertically that is provided in a **building** to facilitate the installation of building services including mechanical, electrical and plumbing installations and facilities such as elevators, refuse chutes and linen chutes.

2.0 THE PRINCIPLES OF CONTAINMENT

Fire separations are provided within buildings to limit the spread of fire and the premature collapse of the building or portion of the building. Certain rooms, areas, suites and major occupancies in buildings are generally fire separated into fire compartments. These fire compartments limit fire spread for a specified period of time intended to allow persons to escape and to limit fire growth until the fire department extinguishes the fire.

Consider a fire compartment to be a box (Refer to Figure 1). Most multi-tenant buildings have many fire compartments (boxes), which are situated side by side and on top of each other. Generally, each fire compartment has walls, a floor and a ceiling. The walls are fire separations that limit the spread of fire horizontally from one fire compartment to an adjoining fire compartment. The walls may also support the load of the building above. The top and bottom of each fire compartment are often referred to as floor assemblies when they separate one storey from another. The floor assemblies are fire separations that limit the spread of fire vertically from one fire compartment to another.

Figure 1
Buildings Are Separated Into Fire Compartments


Vertical Fire Separations (walls or partitions)
Vertical service Space or Exit Stair Shaft
Horizontal Fire Separation (floor assembly)
Fire Separations
Fire Compartment (i.e., a suite, apartment, a suite of offices, a retail outlet, a service room or space, etc.)

2.1 How Fire Separations Limit The Spread Of Fire

Fire separations can be constructed of combustible or non-combustible elements or a combination of materials. For example, masonry walls and reinforced concrete floor slab assemblies are considered to be non-combustible. Due to the physical characteristics of the materials, they have substantial strength and will effectively limit the spread of fire provided the assembly has been properly constructed and maintained.

The design and types of material used in the construction of a fire separation will determine its fire-resistance rating. The fire-resistance rating of a fire separation means the time in hours or fractions thereof that a material or assembly of materials will withstand the passage of flame and transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information prescribed in the Ontario Building Code (OBC).

For example, walls consisting of wood studs with lath and plaster, or gypsum board membranes are common fire-separation assemblies found in existing buildings. The strength of the assembly comes from the wooden structural elements. The fire-resistance qualities of the assembly come from the plaster or gypsum board membranes. The design of the fire separation, the thickness and qualities of materials used and the manner of construction will determine the fire-resistance rating for the entire assembly.

In some buildings combustible materials are not desired for use in the construction of the building. In these instances the fire separations (partition walls) are commonly constructed of steel studs with gypsum board membranes. These fire separations generally do not act as structural supporting walls, but provide a vertical fire separation between different fire compartments on the same storey.

Floor assemblies and roof assemblies that have a specified required fire-resistance rating are structurally supported by walls, columns or arches that have been designed and constructed with the same fire-resistance rating as the assembly they support. This practice prevents premature collapse of the structure under fire conditions resulting from the supporting elements located below having a lower fire-resistance rating.

It is important to note that the fire-resistance rating of an assembly is based upon all of the components of the assembly. The individual elements in themselves do not have a fire-resistance rating (Refer to Figure 2).

Fire separations must be constructed as a continuous element to act as a barrier against the spread of fire. A fire separation is required to be continuous and extend from one fire separation to another or to an exterior wall or roof. Appropriate fire stopping is also essential to retard the passage of smoke and flame, particularly at locations where a vertical fire separation meets a floor or roof assembly.

For example, where a vertical fire separation that requires a fire-resistance rating abuts a horizontal fire separation involving a T-Bar ceiling assembly, the wall must extend through the concealed ceiling space and terminate so that a smoke-tight joint is provided. This is necessary where the vertical fire separation buts against or intersects the floor, roof slab or deck (Refer to Figures 3 and 4).

Figure 2
T-Bar Ceiling Assembly

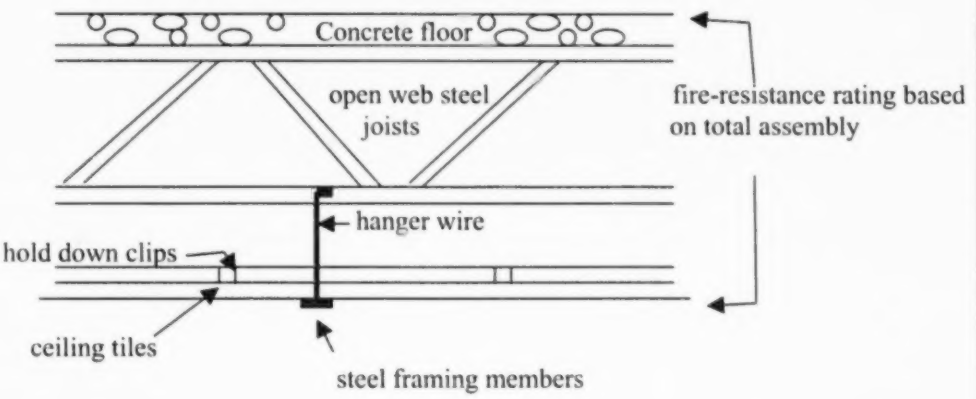


Figure 3
T-Bar Ceiling Assembly

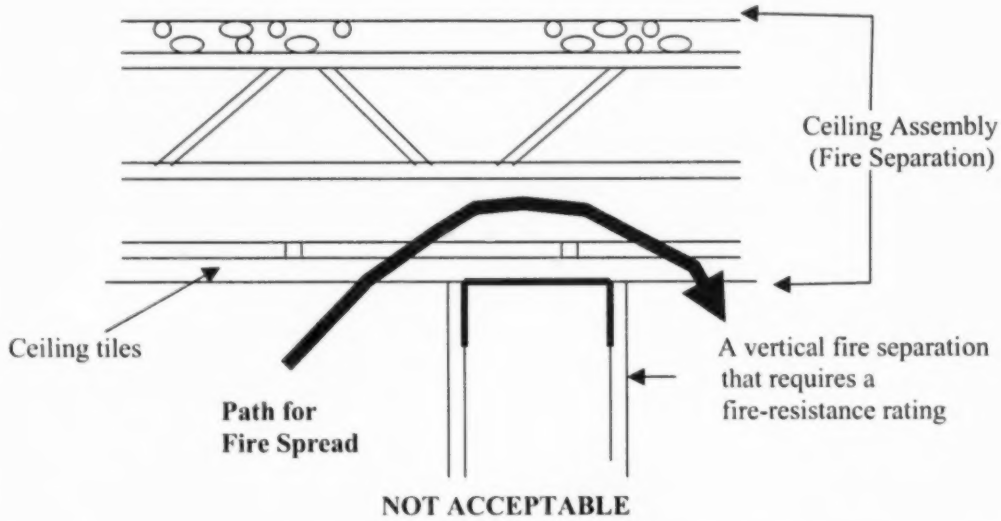
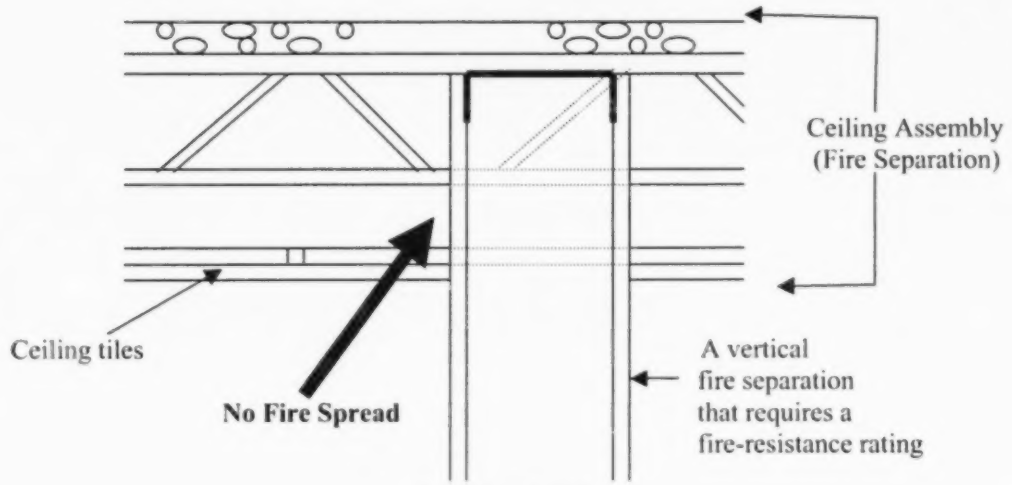

Ceiling Assembly (Fire Separation)
Ceiling tiles
A vertical fire separation that requires a fire-resistance rating
Path for Fire Spread
NOT ACCEPTABLE

Figure 4
T-Bar Ceiling Assembly



ACCEPTABLE

2.2 Building Services and Service Spaces

Buildings have a variety of building services including but not limited to electrical, plumbing, telephone, cable TV, data cables, elevator, garbage chutes, linen chutes and heating, ventilation and air conditioning (HVAC).

Plumbing, wiring and mechanical services commonly pass through required fire separations. The penetrations in the fire separations should be examined to determine if fire stopping has been provided at the penetrations. These penetrations are often poorly sealed or neglected when they are situated within concealed spaces.

Certain HVAC ducts that pass through a required fire separation are required by the OBC to have a fire damper installed at these penetrations. The fire damper is intended to maintain the integrity of the fire separation. Generally, Retrofit Part 9 of the OFC does not require a fire damper to be installed in existing noncombustible ducts that breach an existing fire separation.

Service spaces are provided in buildings to facilitate or conceal the installation of building service facilities such as chutes, ducts, pipes, shafts or wiring. These service spaces may be oriented horizontally or vertically.

Vertical service spaces are shafts that are provided in a building to facilitate the installation of building services such as mechanical, electrical and plumbing installations and facilities including elevators, refuse chutes and linen chutes. For example, special attention should be taken to examine the fire separations where plumbing and other services enter a fire compartment, such as under kitchen sinks and inside bathroom vanities, etc.

2.3 Protection Against Structural Collapse Due To Fire Exposure

Structural elements that support a building under normal conditions can be located within fire separations, or independent from them. To maintain the structural integrity of a building during a fire, these independent elements often have to be protected from fire exposure. For example, when wood is exposed to fire, it can be consumed, resulting in the collapse of the structure. Similarly, structural steel elements of a building will weaken and distort when exposed to extreme temperatures from fire and result in collapse of the structure.

In order for these elements to withstand exposure to fire they are thermally protected from fire using accepted methods. Thermal protection can be obtained through the use of a variety of materials such as:

- lath and plaster
- gypsum board
- sprayed-on thermal coating
- brick or block
- listed suspended ceiling assemblies
- other

Unprotected steel support columns or beams, floor assemblies consisting of open web steel joists, floor assemblies consisting of exposed wood joists and deck, exposed wooden posts or lintels could be of concern. When exposed to a fire, these elements could prematurely fail and contribute to the spread of fire or collapse of the structure.

2.4 Heavy Timber Construction

There are buildings constructed of combustible construction in which the degree of fire resistance is attained by placing minimum size restrictions on the sizes of wood structural members and on the thickness and composition of wood floors and roofs, and by the avoidance of concealed spaces. In these types of buildings, the wooden structural elements are not protected from fire exposure using insulating membranes. For information relating to buildings of "heavy timber construction", refer to the OBC.

3.0 ASSESSING EXISTING FIRE SEPARATIONS FOR COMPLIANCE WITH SECTION 2.2 (MAINTENANCE OF FIRE SEPARATIONS)

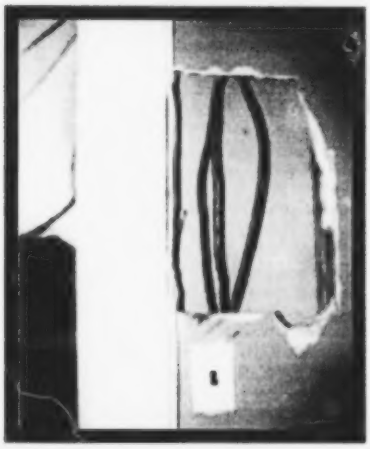
The OBC has regulated the construction of fire separations since1976. Prior to that (pre-1976), municipal building by-laws may have been in place stipulating requirements for the construction of fire separations including specifications for required fire-resistance ratings. The OFC is a companion document to the OBC. The OFC indicates that the owner is responsible for repairing damaged fire separations between major occupancies and between rooms and spaces.

As noted earlier, fire separations are to be constructed as a continuous element to act as a barrier against the spread of fire. Once constructed, however, the fire separations can become damaged from a variety of causes. For example, openings could be made in the fire separations to facilitate installation of plumbing, wiring, heating and ventilating equipment. Generally the OBC regulates these types of alterations and the fire separations in these areas must be properly fire stopped. Where fire separations have been damaged for whatever reason, the OFC requires that repairs be made to maintain the fire-resistance qualities of the fire separation.

In other examples, fire separations can be damaged from:

- deterioration resulting from water exposure,
- deterioration from fire exposure,
- physical abuse by people or equipment damaging the structure or protective membranes,
- failure to replace ceiling tiles in a listed floor ceiling or roof assembly and maintain hold down clips,
- the creation of passageway openings between fire compartments and failing to protect the opening by installing a suitable closure,
- building settlement resulting in cracks,
- corrosion of steel structural elements,
- rotting or decaying wooden structural elements,

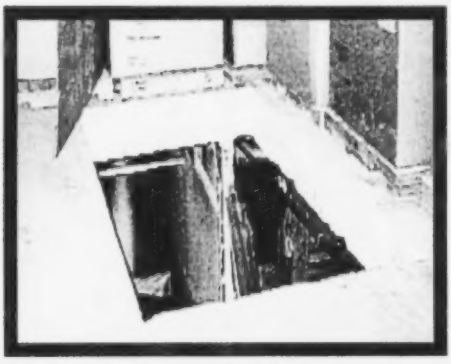
Examples of improper or damaged fire separations;



Fire separation damaged by physical abuse

Closure not provided in passageway between two fire compartments

Fire separation damaged by water



Hole cut in fire separation

3.1 Penalties and Enforcement

When fire separations are damaged, the owner is responsible for promptly repairing the damage.

The building owner or property manager should always contract trades people working in the building to repair damaged fire separations promptly when their work involves breaching any fire separation.

Failure to repair damaged fire separations may lead to prosecution. Upon conviction in accordance with the FPPA, an individual can receive a fine of not more than $25,000 or imprisonment for not more than one year, or both (for each offence). A corporation convicted of an offence is liable to a fine of not more than $50,000 for each offence.

When fire officials observe damaged fire separations between major occupancies they should inform the owner of the deficiency by making reference to Article 2.2.1.1. and provide a list of examples where the damage was observed. Article 2.2.1.1. states:

> *Where **fire separations** between **major occupancies** are damaged in a manner so as to affect the integrity of their **fire-resistance rating**, such damaged **fire separations** shall be repaired so that the integrity of the **fire separations** is maintained.*

When fire officials observe damaged fire separations elsewhere in a building, they should inform the owner of the deficiency by making reference to Article 2.2.2.1. and provide a list of examples where the damage was observed. Article 2.2.2.1. states:

> *Where **fire separations** between rooms, corridors, shafts and other spaces are damaged so as to affect the integrity of their **fire-resistance rating**, the damaged **fire separations** shall be repaired so that the integrity of the **fire separations** is maintained.*

4.0 ASSESSING FIRE SEPARATIONS FOR COMPLIANCE WITH RETROFIT

Retrofit requirements in Part 9 of the OFC are applied to a building or portion of a building in order that a minimum level of life safety can be achieved by satisfying minimum performance levels specified by the regulation. In many instances, existing fire separations may be deemed by Retrofit to satisfy the performance requirements that are outlined by the regulation. However, in other instances the lack of fire separations or the inadequacy of existing fire separations will require the owner to undertake construction in order to comply. Construction may involve upgrading an existing assembly or constructing a new assembly. When construction is going to take place a building permit is generally required. The OBC requirements apply to the construction or renovation of the fire separation with the exception that, the required fire-resistance rating is determined by the Retrofit requirement in the OFC.

The containment requirements imposed by Retrofit are intended to control the size of the fire and smoke spread, and are important for two reasons. The first is to allow the occupants sufficient time to evacuate the building and the second is to aid firefighters in their suppression efforts.

Slowing the spread of fire and smoke is of particular importance where the occupants of a building are asleep or require assistance to evacuate. Under these circumstances more time is required to become aware of a fire emergency and begin evacuation. The potential for the means of egress, access to exit or exit being blocked by fire or smoke is compounded by the fact that multiple fire compartments often share the access to exits and exits, some of which may contain storage or hazardous service areas.

The requirements for fire separations in Retrofit generally address the following:

- the construction and fire-resistance rating of floor assemblies, wall assemblies and structural supports,
- fire separations between occupancies,
- fire separations between suites, rooms, dwelling units and corridors,
- fire separations for areas of hazardous occupancies, and
- fire separations for vertical service spaces.

4.1 Understanding The Regulation Requirements

Persons assessing the building and determining Retrofit compliance must understand how the regulation is to be applied.

Where the OFC requirement refers to an article of the OBC, it is necessary to read the OBC article and consider its content in the context of the Retrofit requirement.

For example, Sentence 9.5.2.1.(2) of the OFC states:

> *Fire separations required by this Section to have a fire-resistance rating shall be in accordance with Subsection 3.1.7. and Articles 3.1.8.1., 3.1.8.2., 3.1.8.3. and 3.5.4.2. of the 1990 Building Code.*

To assist the user of the OFC to quickly refer to the referenced requirements, the applicable OBC references have been consolidated in the Appendix to the Office Consolidation Version of the OFC. This version is available at the Office of the Fire Marshal Website at http://www.gov.on.ca/OFM.

- For occupancies regulated under Sections 9.2, 9.3 or 9.4, refer to Appendix A
- For occupancies regulated under Sections 9.5 or 9.6, refer to Appendix B
- For Two Unit Residential Occupancies regulated under Section 9.8, refer to Appendix C

4.2 Existing Fire Separations Deemed To Be Acceptable

Each Section of Retrofit recognizes that some existing materials in wall or floor assemblies have inherent fire resistance characteristics. For example, in Section 9.5 [refer to Sentences 9.5.2.1.(3) and (4)], existing assemblies using lath and plaster, gypsum wallboard or heavy timber construction in conformance with Article 3.1.4.6. of the OBC, are acceptable in lieu of a 45-min fire-resistance rating.

In another example, under Section 9.6 [refer to Sentence 9.6.2.1.(3)], where a 1-hr or less fire-resistance rating is required, existing wall assemblies, floor assemblies and their supporting assemblies consisting of

(a) reinforced concrete,
(b) masonry, or
(c) clay tile with plaster or gypsum board finish on both sides

shall be deemed to be equivalent to a fire separation having a 1-hr fire-resistance rating.

4.3 Construction and Floor Assembly Requirements

Determination of Retrofit requirements for fire separations is often dependant upon the size of the building and the nature of the building construction and its use. Examples of this include;

- Section 9.3 - Articles 9.3.2.2. to 9.3.2.3.
- Section 9.4 - Articles 9.4.2.1. to 9.4.2.4.
- Section 9.5 - Articles 9.5.2.1. to 9.5.2.5.
- Section 9.6 - Articles 9.6.2.1. to 9.6.2.3.

The applicable construction requirements outlined in the Retrofit articles listed above are intended to ensure a minimum level of structural integrity during fire conditions. They specify the minimum fire-resistance rating for floor assemblies and structural elements such as walls, columns and arches that support the floors. The required fire-resistance rating varies according to the building height and/or the building area. Generally, larger buildings require more time for evacuation and suppression and therefore must maintain a higher level of structural integrity under fire conditions.

Along with building size, building combustibility is a major factor in determining the containment measures that must be provided. The rate at which a fire grows during the early stages of development is relatively unaffected by the combustibility of the structural elements of the building as it usually only involves building contents. As well, combustible or noncombustible structural elements are usually protected with a thermally insulated covering consisting of noncombustible materials. However, once this protection fails, the structural elements are exposed and, if combustible, contribute fuel to the fire. At this point the rate of fire growth is substantially higher in combustible buildings resulting in a greater threat to life. Since larger buildings require longer evacuation times, additional protection provided by early warning smoke detectors in corridors or sprinklers are required for large combustible buildings.

4.4 Alternative Features Deemed To Be Acceptable

In some circumstances Retrofit also permits alternative features to be accepted in lieu of providing the desired fire-resistance rating for the floor assemblies and supporting elements.

For example, refer to Section 9.5, Articles 9.5.2.2. and 9.5.2.3. As you will see, Sentences 9.5.2.2.(1) and (2) establish the building size criteria with which the floor assemblies and supporting elements are to have a 30-min fire-resistance rating. Sentences 9.5.2.2.(3) and (4) and Article 9.5.2.3. provide a waiver of the required 30-min fire-resistance rating of floor assemblies between the basement and first floor based upon the provision of other design features.

Examples where this provision is applied in Retrofit include:

- Section 9.3 - Article 9.3.2.3.
- Section 9.4 – Sentences 9.4.2.2.(3) and 9.4.2.3.(3) and (4) and Article 9.4.2.4.
- Section 9.5 - Sentences 9.5.2.2.(3) & (4), Article 9.5.2.3., Sentences 9.5.2.4.(4), and 9.5.2.5.(2) and (3)

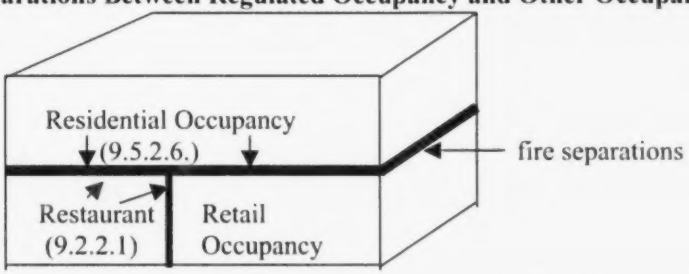
4.5 Fire Separations Between Major Occupancies

Occupancies regulated under Retrofit often must be separated from other major occupancies by a fire separation having a specified fire-resistance rating. Some Retrofit Sections permit alternative features to be accepted in lieu of providing the desired fire-resistance rating.

Examples of this include;

- Section 9.2 - Article 9.2.2.1.
- Section 9.4 - Article 9.4.2.5.
- Section 9.5 - Article 9.5.2.6.
- Section 9.6 - Article 9.6.2.4.

Figure 5
Fire Separations Between Regulated Occupancy and Other Occupancies



4.6 Fire Separations Between Bedrooms Not Within Dwelling Units, Dwelling Units, and Public Corridors

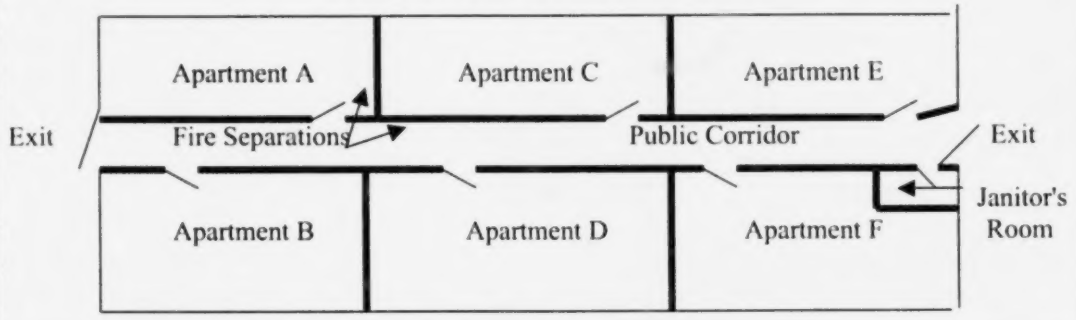
Dwelling units and sleeping rooms not within dwelling units are required to be fire separated from adjacent rooms and areas by fire separations having a specified fire-resistance rating. Additionally, some sections of Retrofit require public corridors to be separated from adjacent rooms and areas by fire separations having a specified fire-resistance rating. The purpose of these requirements is to protect the occupants from fire in adjacent rooms not under their control and to confine fire to the fire compartment of origin. It also provides a protected escape route for occupants to reach available exits (Refer to Figure 6).

In some instances alternative features such as providing sprinkler protection is accepted in lieu of the fire separation having the specified fire-resistance rating.

These provisions are found in:

- Section 9.3 - Article 9.3.2.4.
- Section 9.4 - Article 9.4.2.6.
- Section 9.5 - Article 9.5.2.7.
- Section 9.6 - Article 9.6.2.5.
- Section 9.8 - Article 9.8.2.2.

Figure 6 (Floor Plan View)
Fire Separations Within Floor Areas



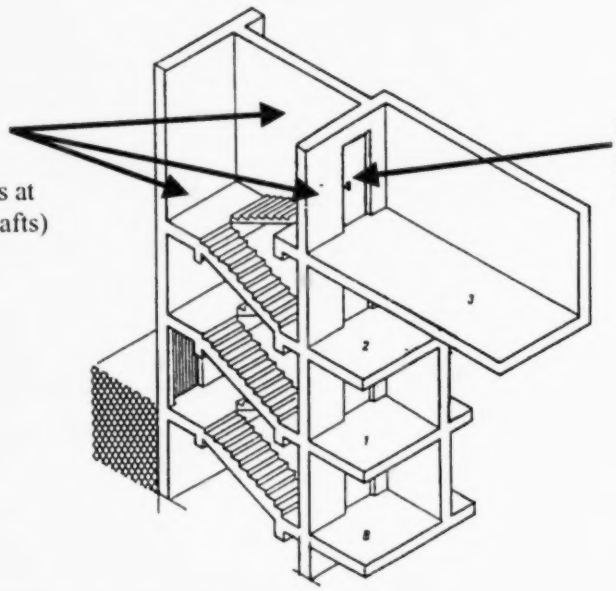
4.7 Fire Separations For Required Exit Stairways

Requirements for the protection of required exit stairways are found in the following Retrofit articles including: 9.2.3.15. to 9.2.3.17, 9.3.3.5., 9.3.3.6., 9.4.3.3., 9.5.3.3. and 9.6.3.4.

In order to protect people using exit stairways from fire on any floor area, the required exit stairway(s) must be separated from the remainder of the building by a fire separation having a specified fire-resistance rating.

Figure 7

Fire Separations (enclosing walls and floor/ceiling assemblies at top and base of stair shafts)



Closures protecting openings

4.8 Fire Separations For Areas Requiring Special Consideration

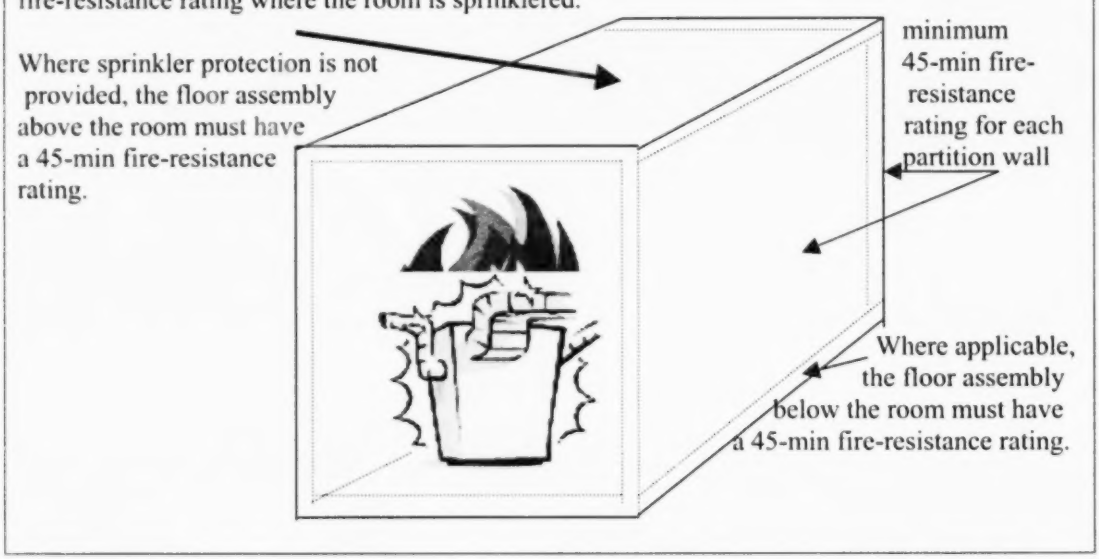
Retrofit identifies various rooms or spaces that require special consideration. In many instances, these spaces are required to be enclosed by fire separations having a specified fire-resistance rating. The enclosure confines the fire to the area of fire origin. Areas requiring special attention may include:

- rooms containing fuel-fired appliances,
- storage garages,
- storage rooms,
- garbage rooms,
- garbage chute and laundry chute discharge rooms,
- incinerator rooms, and
- vertical service spaces

Examples of these requirements include but are not limited to:

Fuel-Fired Appliance Service Rooms

Figure 8
(Example) Fuel-Fired Appliance Service Rooms (9.5.2.10. - Where Applicable)


The floor/ceiling assembly does not require the specified fire-resistance rating where the room is sprinklered.
Where sprinkler protection is not provided, the floor assembly above the room must have a 45-min fire-resistance rating.
minimum 45-min fire-resistance rating for each partition wall
Where applicable, the floor assembly below the room must have a 45-min fire-resistance rating.

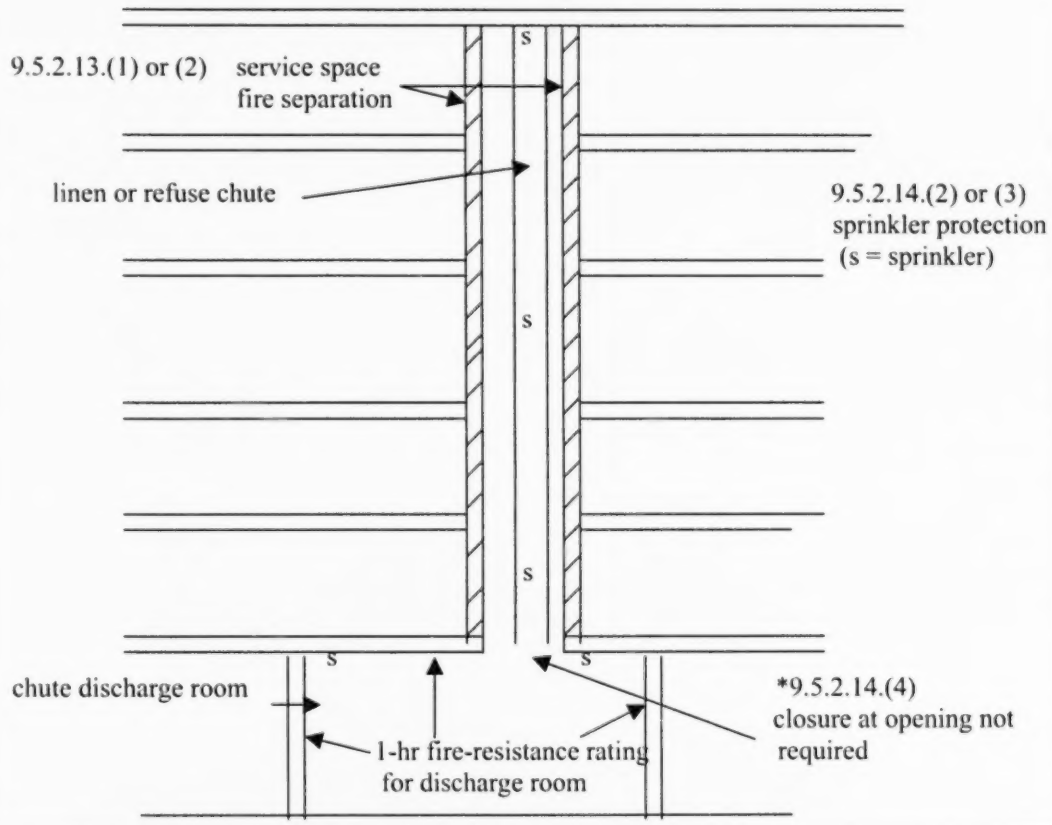
Refer to Figure 8 and Article 9.5.2.10. as an example of Retrofit requirements for fuel-fired appliance service rooms. Fuel-fired appliances are required to be enclosed in a service room separated from the remainder of the building by a fire separation having a 45-min fire-resistance rating with some exceptions. Sentences 9.5.2.10.(1) and (2) state that fuel-fired appliances are not required to be fire separated from the remainder of the building where the building height is not greater than 2 storeys or the building area is less than 400m², or the fuel-fired appliance serves only one suite or room.

Where the vertical fire separation is provided and the service room is sprinklered in the manner specified in Sentence 9.5.2.10.(3), the fire separation above the service room does not require a fire-resistance rating.

Special consideration would have to be made for providing make-up air for the operation of the fuel-fired appliances.

Vertical Service Spaces, Refuse and Linen Chutes

Figure 9
Requirements Linen/Refuse Chutes and for Vertical Service Spaces



*Where an existing closure is provided, it must be maintained.

Refer to Figure 9 and Articles 9.5.2.13 and 9.5.2.14. as examples of Retrofit requirements for vertical service spaces and for linen or refuse chutes.

Vertical service spaces are extremely vulnerable to fire and smoke spread if not adequately sealed. The requirement in Sentence 9.5.2.13.(1) requires the shaft to be separated by a fire separation having a fire-resistance rating equivalent to that required for the floor assembly through which it passes.

There is also provision in sentence 9.5.2.13.(2) to accept existing shaft construction where all openings are adequately sealed to limit smoke movement.

Linen and refuse chutes are required to be fire separated in accordance with the requirements for vertical service spaces. In addition, the room into which the chute discharges is required to be

separated from the remainder of the building by a fire separation having a 1-hr fire-resistance rating. Sprinklers are required in both the chute and discharge room.

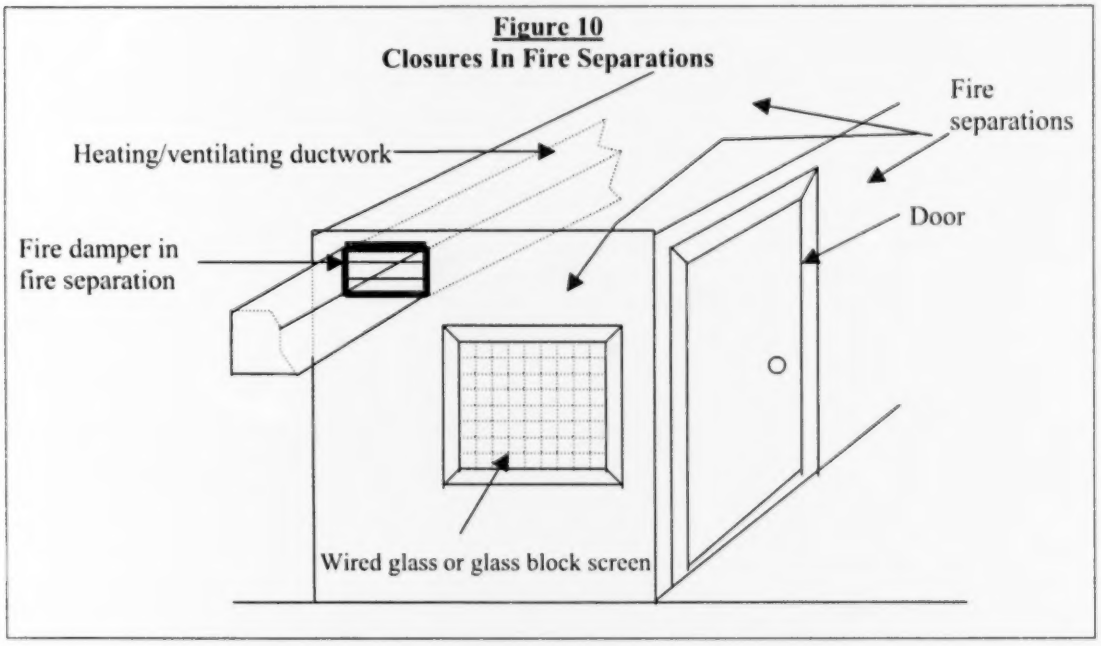
5.0 CLOSURES IN FIRE SEPARATIONS

Openings in fire separations are generally required to be protected with suitable closures to limit the spread of fire through the opening from one fire compartment to another. The OFC defines a "closure". Refer to the definitions for "closure" and "fire-protection rating" in Section 1.2 of this guideline.

Closures can consist of a variety of materials. The closures can be permanently mounted in the fire separation and be fixed shut (i.e. wired glass window, glass blocks, etc.) or they may be capable of being opened or closed when necessary (i.e., door, shutter, damper, etc.). Refer to Figure 10.

When closed, closures limit the spread of fire by virtue of their physical construction. Under the OBC and OFC Retrofit requirements, closures in required fire separations are required to have a specified "fire-protection rating". Closures and frames usually have a permanent label attached to them identifying their listed fire-protection rating.

Figure 10
Closures In Fire Separations



6.0 REQUIRED MAINTANENCE OF CLOSURES IN FIRE SEPARATIONS (Ontario Fire Code Subsection 2.2.3.)

OFC Article 2.2.3.1. states:

> *Where closures are damaged so as to affect the integrity of their fire-protection rating, the damaged closures shall be repaired so that the integrity of the closures is maintained.*

Alternatively, damaged closures may be replaced.

Examples of damaged closures can include but are not limited to:

- Bent door that does not properly close off the opening in a fire separation.

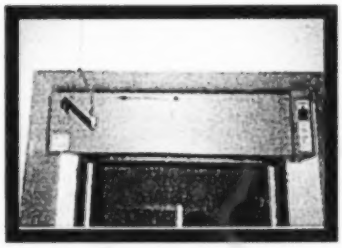
- Door modified improperly by the installation of a vent

- Damaged wired glass screen.

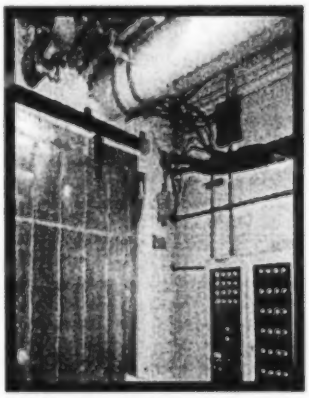
Article 2.2.3.2. states:

Closures in fire separations shall be maintained to ensure that they are operable at all times by:

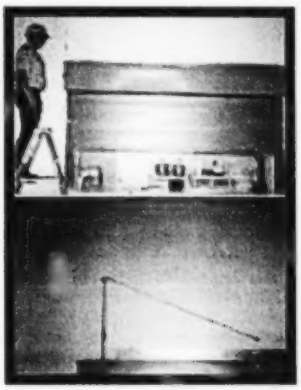
(a) Keeping fusible links and heat or smoke actuated devices undamaged and free of paint and dirt



(b) Keeping guides, bearings and stay rolls clean and lubricated



(c) Making necessary adjustments and repairs to door hardware and accessories to ensure proper closing and latching.



Article 2.2.3.3. specifies that doors in fire separations shall not be blocked or wedged open.

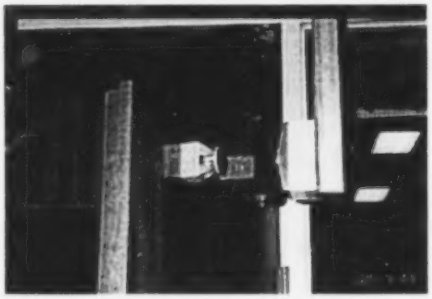
Article 2.2.3.4. specifies that doors in fire separations shall be inspected monthly. "Inspect" is a defined word meaning, conducting a physical examination to determine that the device or system will apparently perform in accordance with its intended function.

Further, Article 1.1.1.3. states:

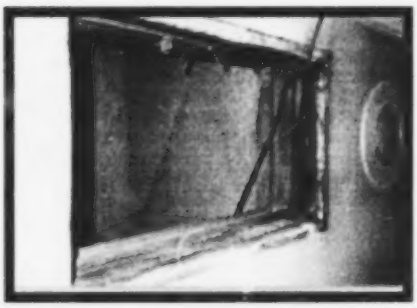
> *Any **appliance**, device or component of a device that does not operate or appear to operate as intended when **checked**, **inspected**, or **tested** as required by this Code shall be repaired or replaced if the failure or malfunctioning of the **appliance**, device or component would adversely affect fire or life safety.*

"Check" means conducting a visual observation to ensure the device or system is in place and is not obviously damaged or obstructed.

Article 2.2.3.5. requires that doors in fire separations in occupied buildings shall be checked as frequently as necessary to ensure that they remain closed unless the door is designed to close automatically in the event of fire, or doors for which an approved fire safety plan contains provisions for closing in the event of fire.

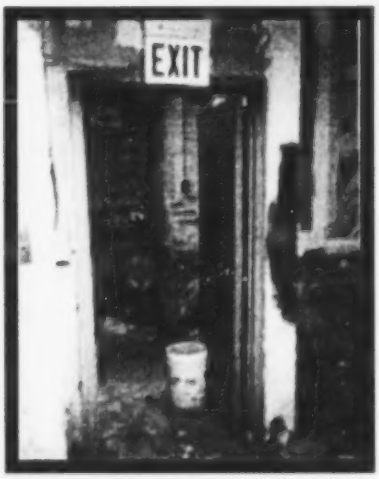


Article 2.2.3.7. specifies that fire dampers and fire-stop flaps shall be inspected annually, or on an approved time schedule.



- Cable prevents fire damper from closing properly.

Article 2.2.3.8. specifies that door openings and the surrounding areas shall be kept clear of anything that would be likely to obstruct or interfere with the free operation of the door.



6.1 Penalties and Enforcement

The owner is responsible for conducting inspections and checks and for initiating repairs and service.

Failure to conduct the required maintenance may lead to prosecution. Upon conviction, an individual can receive a fine of not more than $25,000 or imprisonment for not more than one year, or both (for each offence). A corporation convicted of an offence is liable to a fine of not more than $50,000 for each offence.

When fire officials observe damaged closures, they should inform the owner of the violation by making reference to the applicable Article(s) under Subsection 2.3, and provide a list of examples where the defective conditions are observed.

7.0 ASSESSING CLOSURES IN FIRE SEPARATIONS FOR COMPLIANCE WITH RETROFIT

To help understand how to apply and interpret Retrofit requirements for closures, an example is provided. For this purpose, the applicable requirements under Section 9.5. will be examined and analysed.

7.1 Understanding The Regulation Requirements

The person assessing the closures and determining Retrofit compliance must understand how to apply the regulation.

Similar to requirements for fire separations addressed previously in this guideline (Section 4.2), where the OFC requirement refers to an Article of the OBC, it is necessary to read the OBC Article(s) and consider the content in the context of the Retrofit requirement.

For example;

Sentences 9.5.2.8.(1) of the OFC states:

> ***Closures** in **fire separations** shall be in accordance with Sentences 3.1.8.4.(2), 3.1.8.10.(1) and 3.1.8.11.(1) and Article 3.1.8.13. of the 1990 Building Code.*

Sentence 9.5.2.8.(2) of the OFC states:

> *Openings in a **fire separation** having a 30-min **fire-resistance rating** shall be protected with **closures** having a 20-min **fire-protection rating**.*

The OBC references below state:

> 3.1.8.4.(2) *Except as provided in Sentence 3.1.8.10.(1), the **fire-protection rating** of **closures** shall conform to Table 3.1.8.A. for the required **grade** of **fire separation**.*

3.1.8.10.(1) *A door assembly having a **fire-protection rating** of not less than 20 min is permitted to be used as a closure in*

*(a) a **fire separation** not required to have a **fire-resistance rating** more than 1 h and located between*

*(i) a **public corridor** and a **suite**,*

(ii) a corridor and adjacent sleeping rooms, or

*(iii) a corridor and adjacent classrooms, offices and libraries in Group A, Division 2 **major occupancies**, and*

*(b) a **fire separation** not required to have a **fire-resistance rating** more than 45 min, located in a **building** not more than 3 **storeys** in **building height**.*

3.1.8.11.(1) *Except as provided in Sentence (2), every door in a **fire separation** other than doors to freight elevators and dumbwaiters shall be equipped with a self-closing device designed to return the door to the closed position after each use.*

3.1.8.13. *Except as permitted in Subsection 3.3.3.* (not relevant to Fire Code reference), *every swing-type door in a **fire separation** shall be equipped with a positive latching mechanism designed to hold the door in the closed position after each use.*

Table 3.1.8.A.
Forming Part of Sentence 3.1.8.4.(2)

Fire-Resistance Rating of **Fire Separation**, h	Required **Fire-Protection Rating** of **Closure**, h
3/4	3/4
1	3/4
1½	1
2	1½
3	2
4	3
Column 1	2

After considering the above, Sentences 9.5.2.8.(1) and (2) of the OFC can be interpreted in the following manner;

- first, it is necessary to identify the required fire-resistance rating for the fire separation under consideration,
- determining the required fire-protection rating for the closure is based upon the information derived from Table 3.1.8.A or
  - based upon information contained in Sentence 3.1.8.10.(1) as applicable, or
  - based upon information contained in OFC Sentence 9.5.2.8.(2), and
- closures are required to be equipped with a self-closing device, and
- closures are required to be equipped with a positive latching mechanism.

7.2 Existing Closures Deemed To Be Acceptable

Each Section of Retrofit recognizes that some existing closures have inherent fire resistance characteristics. For example Sentences9.5.2.8.(3) and (4) state;

> *(3) Where a 45-min **fire-protection rating** is required, existing **closures** consisting of*
> *(a) hollow metal or kalamein doors in hollow metal frames, with openings, if any, protected by wired glass, and equipped with self-closing devices, or*
> *(b) wired glass screens set in fixed steel frames*
> *shall be deemed to be in compliance with Sentence (1).*

> *(4) Where a 20-min **fire-protection rating** is required, existing **closures** consisting of 45 mm (1 3/4-in) solid core wood doors installed in solid wood or hollow metal frames and equipped with self-closing devices shall be deemed to be in compliance with Sentences (1) and (2).*

7.3 Alternative Features Deemed To Be Acceptable

In some circumstances Retrofit also permits existing closures to be acceptable, provided alternative compensating features are implemented. For example, Sentence 9.5.2.8.(5) states:

> *(5) Existing **closures** in **fire separations** to which Article 9.5.2.7. applies shall be deemed to be in compliance with Sentences (1) and (2) where*
> *(a) the floor area is **sprinklered**, or*
> *(b) interconnected **smoke alarms** are installed in accordance with Article 9.5.4.4., the building has not more than four **dwelling units** and the **building** provides sleeping accommodation for not more than ten persons.*

7.4 Other Considerations

Sentences 9.5.2.8.(6), (7) and (8) contain additional requirements or provisions that would apply to closures depending upon the circumstances under consideration.

These Sentences state:

> *(6) Despite Sentence (1), **closures** in **fire separations** to which Article 9.5.2.7. applies do not require self-closing devices, except as required in Sentences 9.5.3.1.(2) and 9.5.3.3.(3).*

Sentence (6) can be interpreted to mean that under this section of Retrofit self-closing devices are only required to be installed on existing closures in dead end corridors [9.5.3.1.(2)] and in exit stairways 9.5.3.3.(3)].

> *(7) Existing operable transoms and glass lights shall be fixed shut and shall meet the **fire-protection rating** requirements of Sentences (1) and (2).*

*(8) Despite Sentences (1) and (2), **fire dampers** or **fire-stop flaps** are not required in existing noncombustible ducts at penetrations of **fire separations**.*

Sentences (7) and (8) are self-explanatory.

8.0 ASSESSMENT/INSPECTION PROTOCOL

8.1 Preparation

The person who will be assessing the fire separations and closures for OFC compliance should prepare in advance of conducting the actual inspection:

- review this guideline and understand the concepts contained therein,
- review the applicable Section of Retrofit in its entirety and corresponding references to the OBC to determine the requirements for fire separations and closures as they would apply to the building in question, and
- have suitable equipment to facilitate the examination including
  - flashlight or portable lamp (for the examination of concealed spaces, shafts, etc.),
  - suitable step ladder (for access to concealed ceiling spaces etc.),
  - protective eyewear and clothing (for personal protection and safety),
  - screw drivers of various types (for opening access panels and removal of electrical cover-plates to facilitate observations in concealed spaces and to identify the nature of the existing construction materials used),
  - a clipboard, pen, paper and sufficient checklists, camera (to aid in documenting observations).

8.2 Conducting The Inspection

The building should be inspected in its entirety (if possible and practical) in a progressive manner from top to bottom, room by room, etc. The vertical and horizontal fire separations and closures for each fire compartment should be inspected.

When conducting the inspection of each fire compartment, the person must determine what occupancies are contained in the adjoining fire compartments (above, below and beside). This is necessary to determine what the requirements are and analyse the suitability of the fire separations and closures based upon the applicable OFC requirements.

Vertical service space locations must be identified. The interior and exterior of the service shafts should be examined in detail whenever possible. When it is not possible to inspect both sides of the vertical service space, special care should be taken to examine the exterior of each service space to identify unprotected penetrations in the fire separation.

9.0 DOCUMENTING OBSERVATIONS

When a person conducts an inspection of an existing building to determine compliance with Part 9 Retrofit of the OFC it is not always possible to determine compliance entirely and unconditionally. In a number of instances, a determination of compliance may have to be qualified, and some subjective conclusions must be made by the person conducting the inspection, or by the fire official reviewing an inspection report or other document.

For example, due to concerns for liability, many people conducting an inspection under Retrofit will often qualify their observations. The person may indicate that their conclusions are based on the examination of specific areas inspected within the building or list areas of the building not inspected. Further, the report may state that the examination of the building materials or components was non-destructive in nature and the conclusions are based on observations only. These types of conclusions are by circumstance subjective in nature and may not be precise.

9.1 Sample Forms

The person conducting the inspection may wish to use the following checklists and summary sheet to help document observations and conclusions. A sample form for documenting your observations for each fire compartment is found in Appendix A.

It is important to list the spaces in the building that were not accessible for inspection. This information can be recorded on the sample Summary Inspection Sheet found in Appendix B.

Persons wishing to use these forms are expected to make photocopies of the blank form in quantities desired for future use.

Alternatively, a Microsoft Word version of the forms may be obtained through e-mail by telephoning the Fire Safety Standards Section at (416) 325-3227.

APPENDIX A (Page 1 of 2)
Sample Retrofit Fire Separation Checklist for Walls, Floor/Ceiling Assemblies and Closures
Complete pages 1 and 2 for each fire compartment or for typical fire compartments where appropriate.

Identify the fire compartment(s) being examined, location(s) and its use or occupancy.

(A) Examination of Vertical Fire Separations (Walls)

Describe/identify the occupancy(s) of the adjoining fire compartment(s) situated **beside** the fire compartment being reviewed.

North: South: East: West:

Identify the required fire-resistance rating(s) required for the walls and the applicable OFC reference.

North Wall - Required fire-resistance rating: OFC Reference Number:

South Wall - Required fire-resistance rating: OFC Reference Number:

East Wall - Required fire-resistance rating: OFC Reference Number:

West Wall - Required fire-resistance rating: OFC Reference Number:

The existing interior fire separations **(walls)** situated between fire compartments consist of:

☐ concrete ☐ not applicable
☐ concrete block, brick, or stone ☐ not applicable

The existing fire separations **(walls)** situated between fire compartments have surface membranes consisting of: ☐ gypsum board ☐ not applicable

☐ lath and plaster ☐ not applicable

The existing fire separations **(walls)** are constructed of other materials ☐ Yes ☐ No
Describe construction:

The fire separations **(walls)** provide a continuous barrier. There are no gaps, cracks, breaches, or other types of defects noted. ☐ Yes ☐ No

If "No" describe the defective conditions and locations:

There is a suspended ceiling tile assembly(s). ☐ Yes ☐ No ☐ Not Applicable

The fire separations **(walls)** situated above the suspended ceiling and located between fire compartments were examined and it was determined that there is a smoke tight barrier provided. ☐ Yes ☐ No

If "No" describe:

(B) Examination of Horizontal Fire Separations (Floor/Ceiling Assemblies)

Describe the occupancy(s) of the adjoining fire compartments situated **above** the fire compartment:

Identify the fire-resistance rating required for the floor/ceiling assemblies **above** the fire compartment and identify the applicable OFC reference for the fire separation:
Required fire-resistance rating: OFC Reference Number:

APPENDIX A (Page 2 of 2)
Sample Retrofit Fire Separation Checklist for Walls, Floor/Ceiling Assemblies and Closures
Complete pages 1 and 2 for each fire compartment or for typical fire compartments where appropriate.

Describe the occupancy(s) of the adjoining fire compartments situated **below** the fire compartment:

Identify the fire-resistance rating required for the floor/ceiling assemblies **below** the fire compartment and identify the applicable OFC reference for the fire separation:
Required fire-resistance rating: ..... OFC Reference Number: .....

The existing fire separation (floor/ceiling assembly) above the fire compartment consists of
☐ concrete ☐ unprotected open web steel joist and metal pan ☐ unprotected wood
☐ an assembly with a gypsum board membrane ☐ an assembly with a lath and plaster membrane

Describe other:

The fire separation(s) identified above provide a continuous barrier. There are no gaps, cracks, breaches, evident or other types of defects noted. ☐ Yes ☐ No

Describe defective conditions and locations:

There is a suspended ceiling tile assembly(s) in the fire compartment. ☐ Yes ☐ No ☐ Not App.
If "Yes" complete the following:
The suspended ceiling is part of a listed fire separation. ☐ Yes ☐ No ☐ Undetermined
The portion of the floor/ceiling assembly above the T-Bar suspended ceiling consists of
structural steel and concrete: ☐ Yes ☐ No
wood joist and sub floor: ☐ Yes ☐ No
Describe other assembly:

The floor/ceiling assembly of materials above the ceiling tiles was examined and determined that there is a smoke tight barrier provided by the assembly. ☐ Yes ☐ No

(C) Structural Supporting Elements

The structural supporting elements (walls, column, arches, etc.) of the floor/ceiling assembly have the required fire-resistance rating or suitable protective membranes. ☐ Yes ☐ No

If "No" describe:

(D) Closures
The openings in the fire separations are protected with appropriate closures. ☐ Yes ☐ No
The closures consist of: ☐ labelled door and frame fire-protection rating on labels
☐ hollow metal/kalamein door and frame ☐ 45mm solid core wood & wood or metal frame

☐ other - describe

☐ equipped with self-closing device ☐ equipped with positive latching mechanism

Print Name of Person Conducting Inspection ..... Signature ..... Date .....

APPENDIX B
Sample Retrofit Fire Separation and Closure Assessment Summary Sheet

Address of building: _____

Owner: _____ Phone: _____

Address of Owner: _____

Number of storeys above grade: _____ Number of storeys below grade: _____

Building area (as determined using the OFC definition) _____

List major occupancies and locations: _____

_____

Retrofit Section(s) applied: _____

The required fire separations and closures of each fire compartment in the building were inspected with the exception of the following spaces:

List the fire compartments not inspected, their locations, and the reason for not inspecting.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

The fire separations and closures of each fire compartment listed in the attached checklists were inspected by adhering to the practices outlined in the Office of the Fire Marshal guideline "Assessing Existing Fire Separations and Closures for Fire Code Compliance". The attached pages of checklists accurately reflect the observations made at the time of inspection. The fire compartments that were not inspected are listed above and the reasons for not inspecting are stated.

_____	_____	_____
Print Name of Person Conducting Inspection	Signature	Date